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ART UNIT	PAPER
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Commissioner for Patents

In response to the boards request for a translation of Japanese document 03-134367, a translation in the English language is attached.


12/10/04

PTO 05-834

Japanese Kokai Patent Application
No. Hei 3[1991]-134367

VEHICLE TRANSMISSION

Yoshiki Onoguchi et al.

UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. DECEMBER 2004
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JAPANESE PATENT OFFICE
PATENT JOURNAL (A)
KOKAI PATENT APPLICATION NO. HEI 3[1991]-134367

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No. of Claims:	2 (Total of 4 pages)
Examination Request:	Not filed

VEHICLE TRANSMISSION

[Sharyo yo hensoku sochi]

Inventors:	Yoshiki Onoguchi et al.
Applicant:	Nissan Motor Co., Ltd.

[There are no amendments to this patent.]

Claims

1. A vehicle transmission characterized in that it is equipped with a support rod, one end of which is coupled to the body of a power unit and the other end of which is elastically coupled to the vehicle compartment floor member, said support rod supporting a shift lever in a freely rocking manner near the other end; and a control rod that couples the shift end of the shift lever to the transmission in said power unit; wherein a mass of specified weight is attached to the other end of said support rod.

2. The vehicle transmission of Claim 1 characterized in that a bracket that allows elastic deformation extending in the longitudinal direction of the support rod is included between said mass and the other end of the support rod, where said bracket and mass form a dynamic damper.

Detailed explanation of the invention

Application field in industry

The present invention pertains to a manual transmission for a vehicle. More specifically, the present invention pertains to a vehicle transmission that can prevent vibration of the shift lever.

Prior art

In the prior art, in a power unit of a horizontal engine type, the transmission in the power unit and the chamber of the vehicle are isolated from each other. Consequently, the shift lever in the chamber and the transmission are connected to each other via a prescribed linking mechanism, for example.

As shown in Figure 6, one end of support rod (1) is connected to power unit (2), and the other end is supported via elastic member (4) beneath the floor (3) of the vehicle. At the same time, the other end supports shift lever (5) in a freely rocking manner. Also, one end of control rod (6) is connected to the transmission in power unit (2), and the other end is connected to the shift end of shift lever (5). By shifting shift lever (5), control rod (6) is shifted in position to perform speed change operation of the transmission.

However, since support rod (1) and control rod (6) vibrate with power unit (2), significant vibrations occur in the vibration mode shown in Figure 6 for said rods, and shift lever (5) may vibrate annoyingly.

For example, as described in Japanese Kokai Patent Application No. Sho 59[1984]-96020 and Japanese Kokai Utility Model No. Sho 59[1984]-80826, it is possible to adjust the vibration node position.

That is, as shown in Figure 7, the weight of mass (8) attached to the end of control rod (6) on the side of connection portion (7) with shift lever (5) and the offset amount of connecting part (7) are selected appropriately so that the vibration node position of control rod (6) agrees with the position of connecting position (7). As a result, even when control rod (6) vibrates, the supporting point of shift lever (5) does not match the node point (see Figure 7), and the problem of unpleasant vibration of the shift lever can be solved.

Problems to be solved by the present invention

As explained above, for the constitution in which mass (8) is attached to the rear end of control rod (6), gear slip-out may easily take place for the following reason, which is undesirable.

That is, for the vehicle with a horizontal engine, along with the rolling movement generated in power unit (2) (the direction indicated by arrow A shown in Figure 7), control rod (6) is shifted in the direction indicated by arrow B in Figure 7. However, when mass (8) is set on the rear end of control rod (8), it is difficult for control rod (6) to follow said rolling movement due to the inertia of said mass (8). As a result, gear slip-out may easily take place for the transmission.

Purpose of the invention

The purpose of the present invention is to prevent gear slip-out and to prevent vibration of the shift lever.

Means to solve the problems

In order to realize the aforementioned purpose, the present invention provides a vehicle transmission characterized in that it is equipped with a support rod, one end of which is coupled to the body of a power unit and the other end of which is elastically coupled to the vehicle compartment floor member, said support rod supporting a shift lever in a freely rocking manner near the other end; and a control rod that couples the shift end of the shift lever to the transmission in said power unit; wherein a mass of a prescribed weight is attached to the other end of said support rod.

Operation

According to the present invention, by adjusting the weight of the mass so that the node position of the vibration node of the support rod agrees with the shift lever supporting position, it is possible to prevent vibration of the shift lever.

Also, since the inertial force of the mass does not act on the control rod, it can prevent gear slip-out.

Application examples

In the following, the present invention will be explained with reference to the figures.

Figures 1-5 illustrate an application example of the vehicle transmission of the present invention.

In Figures 1 and 2, (11) represents the support rod. One end of support rod (11) is coupled to the body of power unit (12). Holder rubber (14) is attached to the other end of support

rod (11) by means of bolt (13). The end is elastically coupled to vehicle compartment floor member (15) via said holder rubber (14). In addition, near the other end of support rod (11), shift lever (16) is supported in freely rocking manner via support part (11a). The relative position of support part (11a) and power unit (12) are maintained. (17) represents the control rod. Control rod (17) is connected between shift end (16a) of shift lever (16) and the transmission in power unit (12), and it transmits the speed change operation of shift lever (16).

Mass (18) of prescribed weight is attached to the other end of said support rod (11) via elastic deformable bracket (19) extending in the longitudinal direction of support rod (11).

The elasticity of said bracket (19) is selected appropriately so that the bracket exhibits little elasticity when the transmitted vibration is at the low end of the spectrum, and acts like a spring at the high frequency end of the spectrum. As a result, in the low frequency region of the vibration that is transmitted from power unit (12), such as in the region where the vibration of the shift lever becomes a problem, mass (18) simply acts as a damper on support rod (11). Also, in the high frequency region of the vibration transmitted from power unit (12), such as in the region where gear noise occurs, mass (18) and bracket (19) act as a dynamic damper. Here, the resonant frequency f when said mass (18) and bracket (19) act as a dynamic damper is represented by the following formula:

$$f = \sqrt{\frac{3 \cdot E \cdot J}{m \cdot l^3}} \dots \dots \textcircled{1}$$

where, m : mass of mass (18) ($\text{kg} \cdot \text{s}^2/\text{cm}$); E : Young's modulus (kg/cm^2), l : length of bracket (19) (cm), J : second moment of the area of bracket (19). For example, the characteristics of the dynamic damper composed of mass (18) and bracket (19) are shown in Figure 5, and resonant frequency f of formula $\textcircled{1}$ is set in the gear noise generation region.

With the aforementioned constitution, when power unit (12) vibrates in the low frequency region, the vibration is coupled from power unit (12) to support rod (11) and control rod (17), which vibrate at the low frequency. However, since the weight of mass (18) is adjusted appropriately to have the node position of the vibration of support rod (11) agree with the position of support part (11a) as shown in Figure 3, it is possible to prevent the vibration from being transmitted to shift lever (16).

On the other hand, when power unit (12) vibrates at the high frequency, the vibration is coupled from power unit (12) to support rod (11) and control rod (17), which vibrate at the high frequency. However, since mass (18) and bracket (19) act as a dynamic damper under the vibration of support rod (11), the high-frequency vibration transmitted through support rod (11)

can be reduced, and gear noise can be reduced. Consequently, the unpleasant feeling of the driver from the gear noise can be eliminated.

Also, in this application example, as mass (18) is attached to support rod (11), even when power unit (12) performs in rolling movement in the direction indicated by arrow C shown in Figure 1, the inertial force of mass (18) does not act on control rod (17), so that gear slip-out can be prevented.

Also, when there is no need to adopt countermeasure against gear noise, there is no need to use bracket (19). Consequently, as shown in Figure 5, mass (18) may be directly fixed by means of welding or the like to the head of bolt (13).

Effects of the invention

The present invention can prevent gear slip-out, and it can prevent vibration of the shift lever.

Brief description of figures

Figures 1-5 are diagrams illustrating an application example of the vehicle transmission of the present invention. Figure 1 is its oblique view. Figure 2 is an enlarged view of the main portion. Figure 3 is diagram illustrating the support rod and the vibration mode of the rod. Figure 4 is a graph illustrating the characteristics of the dynamic damper. Figure 5 is an enlarged view illustrating another embodiment of the mass. Figure 6 is a diagram illustrating the vehicle transmission and its vibration mode in the prior art. Figure 7 is a diagram illustrating another vehicle transmission and its vibration mode in the prior art.

- 11 Support rod
- 12 Power unit
- 16 Shift lever
- 17 Control rod
- 18 Mass
- 19 Bracket

第 1 図

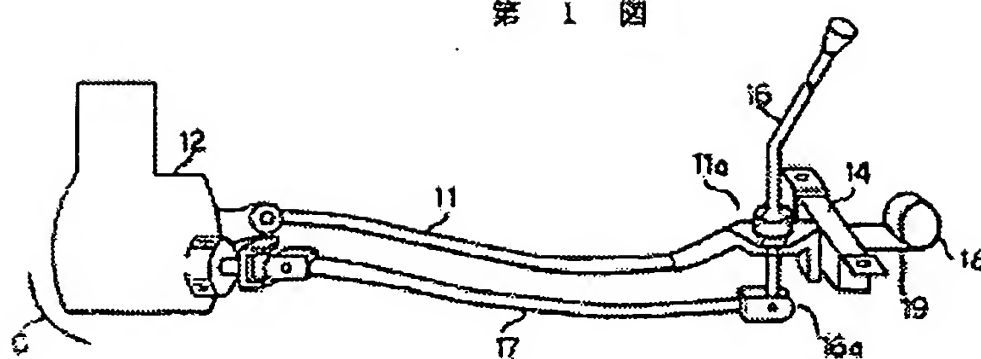


Figure 1

Key: 11 Support rod
 12 Power unit
 16 Shift lever
 17 Control rod
 18 Mass
 19 Bracket

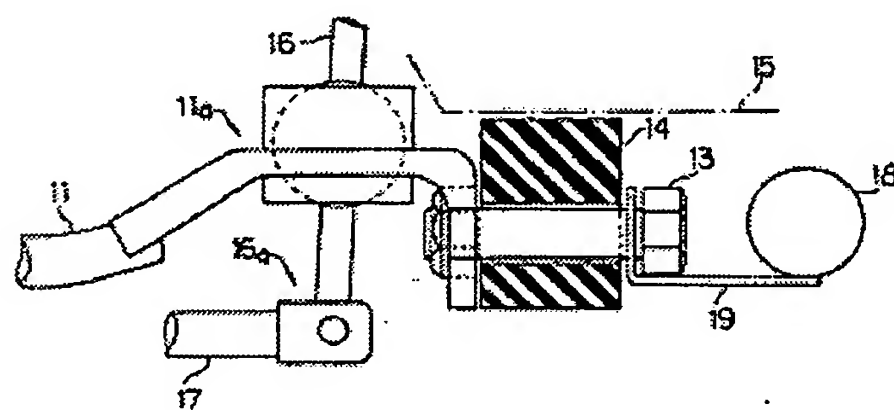


Figure 2

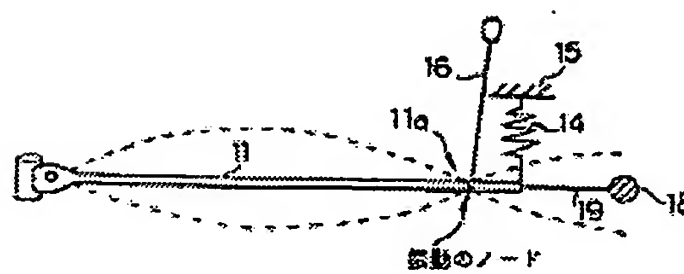


Figure 3

Key: 1 Node of vibration

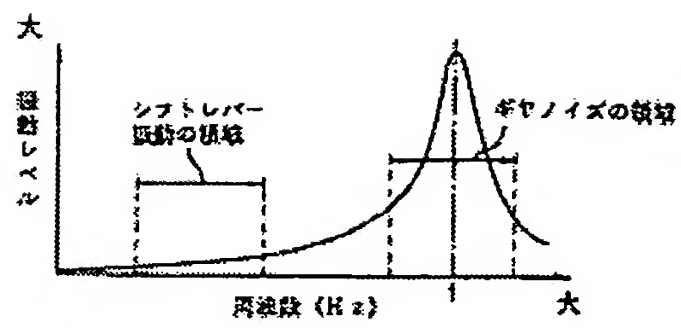


Figure 4

- Key: 1 Vibration level
 2 Frequency
 3 Higher
 4 Region of vibration of the shift lever
 5 Region of gear noise

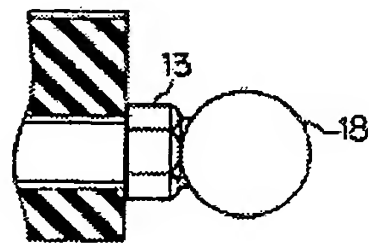


Figure 5

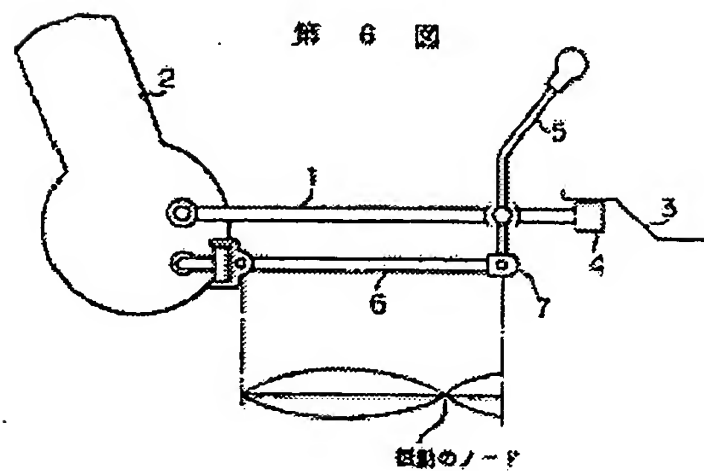


Figure 6

- Key: 1 Node of vibration

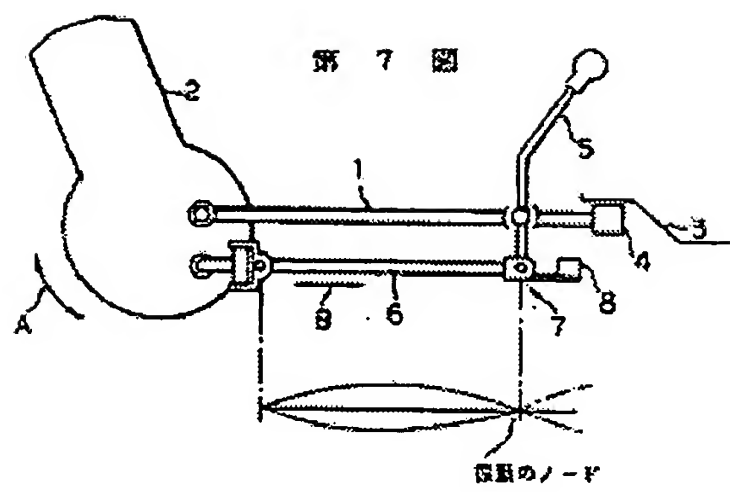


Figure 7

Key: 1 Node of vibration